

An assessment of the Training Needs of Smallholder Food Crop Farmers for Sustainable Farming in Teso-South Sub-County, Busia County – Kenya: A Gendered Analysis Approach

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Abstract

This study assessed the training needs of smallholders food crop farmers in Teso-South Sub-County of Busia County, Kenya. A gendered analysis approach was taken and three research questions were adopted, which were; What are the training needs of smallholders food crop farmers? What is the relationship between gender and previous training of smallholders' food crop farmers? Is there a relationship between gender and training needs of smallholders' food crop farmers? A survey research design was employed and a structured questionnaire with both closed and open ended question was used to collect data from 124 smallholders' food crop farmers who were selected proportionately from the wards in Teso South Sub-County. The findings revealed that more male farmers (53.1%) have not received training compared to only 35.0% of female farmers. Most female farmers (65.0%) have received training compared to 46.9% of male farmers. The established farmers training needs included training in; seed selection/ Production, Crop management, Disaster management, Crop Diversification, and Using new methods of farming on the farm. A Chi-square test for independence (with Yates Continuity Correction) indicated no significant association between gender and previous training status of the smallholders farmers, $\chi^2 (1, n = 124) = 3.42, p = .064, \phi = -.18$. Also, the relationship between gender and farmers total training needs was investigated using Spearman's Rank Order Correlation (ρ) which revealed a weak, negative correlation between the two variables, $r = -.12, n = 121, p < .202$, with gender association with farmers total training needs being low. The coefficient of determination indicated that gender helps to explain only 1.44% of variance in the training needs. It was concluded that gender should not be used as a basis for determining farmers training needs. The training needs for both gender are relatively the same.

Key Words: *Smallholders farmers, Training Needs, Gender, Food security*

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I. Background of the Study

The government of Kenya through the Ministry of Agriculture has made investments in crop farming to address both food security issues in the country as well as boost the development of agro based manufacturing industries. Indeed, with an estimated 75% of the working Kenya's population living in the rural areas and accounting for 70% of the marketed agrarian produce on farms averaging only 0.2 and 3 hectares, as opposed to large scale farming (accounting for 30%), more attention needs to be forecast on smallholders' farmers (Nasike, 2020; Oberc & Arroyo Schnell, 2020; World Bank, 2015, pp. 2-3). This is because its worrying when average farm sizes are continuously reducing and land distribution is becoming more concentrated, contributing to momentous constraints on crop production, particularly for smallholders' farms. Also, the proportion of smallholders' farmers accessing extension services is meager comparable to large scale farmers, therefore, the need for them to have adequate knowledge to produce by themselves with little support. Worse still, more of Kenya's food is now processed, low in nutrients and 14% of it imported – raising questions of food security, public health and sustainable food crop farming (World Bank Data, 2021; Oberc & Arroyo Schnell, 2020).

Sub-Saharan Africa's population is growing at 2.7% a year, which experts agree that if this trend is maintained, Africa's population will double by 2050 – roughly 2.5 billion people (The Economist, 2020; Jayne, et al., 2016). Population increase and general subdivision of farm land through inheritance witnessed, has destabilized sustainable food production, a fact that signals a looming food crisis if food production per hectare remains low, dwindles or stagnates. It's even more threatening, on the contrary, as numbers of smallholders' farmers keep shrinking with the advent of globalization of agriculture policies in 1991, from 110 million to 95.8 million - a loss of nearly 15 million farmers, or 2,000 farmers per day (Shiva, 2016). This has implications on farm labour and insidiously a loss of skills and knowledge needed for optimal farm production. Hence, sustainable farming and food security has become a key universal challenge, Teso-South Sub-County notwithstanding. There's need for innovation and more sustainable crop production knowledge passed to the smallholders' farmers that can increase output in much smaller parcels of land with minimal labour (Oberc& Arroyo Schnell, 2020).

The anticipated increased demand for food as a result of population growth, needs skills and knowledge, tools, systems and policies that will contribute to sustainable food production as well as long-lasting development (Man et al., 2016). Therefore, building food crop production-related competences in a critical mass of smallholders' farmers in the rural areas become inevitable, and food security conversations need to keep dominating nowadays to raise awareness of eminent food crisis. It's important to audit knowledge and skills held by smallholders' farmers and assess their training needs to confidently move forward towards establishing a lasting solution to food insecurity, since a range of sustainable farm food production means exist, yet Kenya has had episodes of food insecurities (Mohammad and Hasan, 2018). Training needs assessment helps identify what learning and capacity strengthening activities should be undertaken to enhance the productivity, performance and impact of smallholders' farmers individually and the communities they belong at large (Okeowo, 2015).

Smallholders' farmers have been trained before by agricultural extension agents from government and organizations like USAID and World Food Programme, across western Kenya. For instance, in 2011, 10,700 farmers from 79 organizations in western Kenya, were trained. Agricultural extension officers are credited for most training that farmers have received and remain the main link for dissemination of agricultural knowledge and innovation in Kenya. They have been relied on not only for crop farming information and technology, but also actively participated in community organization, and other issues which affect the quality of life in rural communities (FAO and World Bank, 2000). But, there's growing concern that previous trainings smallholders' farmers have undergone on food crop production seem to either have ceased to work probably with changes in the environment (climate changes and land degradation), failure to trickle down to new generations of farmers – therefore not applied, or diminished support and refresher trainings for recaps that would strengthen capacity in the farmers.

It raises questions on whether the training was adequate or appropriate. Or are there training needs that could have arisen over time that have not been addressed? Lastly, could the unique gender roles played on the farm necessitate gender specific trainings? Njobe and Kaaria (2015) argue that women play a critical role in Africa's agricultural sector, from the production to marketing of products. In Sub-Saharan Africa, they comprise 52% of the total population in this sector; they are responsible for approximately 50% of the agricultural labour force and contribute up to 60 to 80% of the region's food. They are therefore crucial entities to farm food production. Consequently, an assessment to understand the training needs would be prudent in order to recommend impactful training programmes.

Teso South Sub County has 78% of its population relying on agriculture for food and employment, and approximately 50% of household income is generated from the farm. In the context of this study, it is paramount to highlight the fact that, as noted in the World Food Programme (WFP) – Kenya Comprehensive Food Security and Vulnerability Survey (CFSVA) report, apart from Turkana County which has the highest levels of food insecurity in Kenya, “The next most food insecure counties (by FCS indicator) are Samburu, Tana River, Baringo, West Pokot, Busia and Siaya, (WFP, 2016, p. 4). The report further observes that, food shortages in “... rural households were more likely ... than urban (36% vs 23%). Lack of food was most extreme in Turkana (86%) followed by Busia, Homa Bay, Baringo, Siaya and Wajir where more than 60 percent experienced shortages,” (p. 6).

It's against this background that this research project sought to identify farmers training needs as there's indication of low farm yields contributing to perpetual food shortages, yet farmers have undergone training by different entities (government extension officers or organizations like USAID, One Arce Farm and World Food Programme). The farm sizes seem to be shrinking as the population growth is relatively high owing to high fertility rate, averaging 6%, which is higher than the countries average (Masters, et al., 2013; Moore, 2018). Soil fertility, on the other hand, is declining and extreme weather conditions (droughts and floods) are becoming common (Bryan, et al., 2011; GIEWS, 2016; AGRA, 2014). Questions raised in this scenario is that could it be that the farmers training needs are different? Are there differences in training needs between farmers

of different gender? This signals the need to approach food production through farming differently. This study seeks to establish training needs, a fact that will impact food production in Teso North Sub County.

Statement of the Problem

Smallholder's farmers produce an estimated 70% of marketed agrarian produce in Kenya in farms averaging between 0.2 and 3 hectares, compared to large scale farming that contribute only 30%. Focus on smallholders farmers would then be prudent to address food security and sustainable food crop farming means. Busia County Government in its quest to revamp Agriculture, through the agricultural department initiative, has conducted a range of farmers training in cash crop farming like sugarcane, cotton and palm oil, but ignored food crop farming. The farm holding have shrunk to uneconomic average of 1.7 acre per household, courtesy of years of inheritance and subdivision and most of this land have suffered years of soil erosion and fertility depletion. The net effect has been perpetual low food crop yields and food shortages leading to importation of food from neighbouring country of Uganda. The logic thing is a need for a different approach to farming that necessitates training and retraining of farmers for sustainability. Therefore, investigating farmers training needs will go a long way in structuring trainings that have much impact.

Reports from the World Bank and Food and Agriculture Organization (FAO) indicate that on average farms run by women being less productive than those run by men. This has been attributed to women lacking access to resources such as training. It would therefore be appropriate to empower women for more farm output as well as to minimize any inequities between male and female farmers as much as possible, hence a gender analysis approach for this study. Also, the dominant gender perceptions within communities may prevent men or women from accessing information and training that may be essential for effective operations on the farm. Worse still, extension services may be influenced by these perceptions leading to gaps in knowledge between men and female farmers. Incidences of men undertaking agronomic training while women nutrition trainings has been observed in some African communities, Kenya included. This in the longrun negatively affects farm production as women farmers find it difficult to effectively supervise or instruct farm workers due to inadequate training. Its ideal that smallholders farmers trainings are transformed to be gender responsive so as no one is left behind. This study investigated the farmers training needs; resources needed to be incorporated in farmers training; the association between gender and previous food crop farming training undertaken by the smallholder crop farmers; and lastly, relationship between gender and training needs of smallholders' food crop farmers.

Research Objectives

- (i) To investigate the crop farming training needs of smallholder crop farmers for sustainable farming in Teso South Sub- County, Busia County – Kenya
- (ii) To determine resources that need to be incorporated in training programs of smallholder crop farmers for sustainable farming in Teso South Sub- County, Busia County – Kenya
- (iii) To determine association between gender and previous food crop farming training undertaken by the smallholder crop farmers in Teso South Sub- County, Busia County – Kenya
- (iv) To examine the relationship between gender and training needs of smallholders' food crop farmers in Teso South Sub- County, Busia County – Kenya

Research Questions

- (i) What are the training needs of smallholders food crop farmers?
- (ii) What is the relationship between gender and previous training of smallholders' food crop farmers?
- (iii) Is there a relationship between gender and training needs of smallholders' food crop farmers?

Justification of the Study

Busia County generally and by extension, Teso South Sub County, has high fertility rate above the average of the country at 6%, which means high likelihood of farms shrinking further by subdivision through inheritance, from the current already uneconomical average 1.7 acres per household. The farm land soil fertility is declining rapidly and extreme climate events, especially droughts, are becoming more frequent. This will aggravate food security situation in the Sub County. In addition, it has been established that Covid-19 pandemic has escalated the decrease in conventional employment opportunities and compelled youthful job seekers to rely on available farms for their livelihoods. Already Busia County is experiencing employment challenges (unemployment rate at 66.7%) and registers high poverty levels. As observed, "Cultural, social, governance and political factors play a key role in food production, processing, distribution, storage and consumption," (Ministry of Agriculture, Livestock and Fisheries, 2017, p. 12). Consequently, this project research study outcome will contribute potentially to facilitation of addressing the need for increase in food crop farm output by suggesting and recommending ways to bridge farmers' knowledge and skills gaps. Furthermore, establishment of farmers' crop cultivation training gaps will not only make farmers aware of what they need to

be more effective, but also remarkably increase their potential to take the next necessary steps to build sustainable food crop cultivation capacity and positively impact their farm yields.

II. Material and Methods

Study area is Teso South Sub-County, which covers 236.8 Km² in surface area with an estimated population of 168, 116 people out of which 80, 484 are male, 87,630 are female and 2 are intersex (KNBS 2019). The communities mainly practice subsistence farming and some of the crops grown there include maize, nuts and sugarcane, cassava, sweet potatoes, millet and sorghum. They also practice smallholder livestock rearing. A survey research design was adopted and a structured questionnaire with both closed and open ended question was used to collect data from 124 smallholders' food crop farmers who were selected proportionately from the wards in Teso South Sub-County. The respondents remained anonymous and their consent was first sought before participating in the study. Data was analysed using descriptive statistics and inferential analysis.

Data Analysis and Discussion of Results

The survey collected data from 124 respondents who were farmers in Teso South Sub County, Kenya. Demographic data and data addressing the study objectives were collected.

Demographics Descriptives

The study collected demographic data from respondents. This includes their age, gender, marital status and academic levels. Age had nine categories to choose from while marital status and education level each had five categories. The demographic data is presented in table 1.

Table 1: Demographic Descriptives

Demographics	Number	Percentage
Age	124	100
18 - 25 years	4	3%
26 – 30 years	7	6%
31 – 35 years	14	11%
36 – 40 years	15	12%
41 – 45 years	19	15%
46 – 50 years	22	18%
51 – 55 years	20	16%
56 – 60 years	12	10%
61 years and above	11	9%
Gender	124	100
Male	63	51%
Female	61	49%
Marital Status	124	100
Married	100	81%
Single	10	8%
Separated	1	1%
Widow/er	10	8%
Divorced	3	2%
Education Level	124	100
No Formal Education	9	7%
Primary	61	49%
Secondary	38	31%
Tertiary	12	10%
University Degree	4	3%

Age distribution of respondents showed that the age brackets of 41 - 45 years, 45 – 50 years and 51 – 55 years comprised the larger percentage of farmers with 15%, 18% and 16% respectively. Small percentages of 3%, 6% and 9% represented respondent in the age brackets of 18-25 years, 26 – 30 years and 61 years and above respectively. The low percentage in the age groups between 18- 25 years could be because majority of individuals in this age bracket could still be studying in school and college level, between age group 26 – 30 years may not be owning land to farm on and 61years and above may relatively be inactive due to their old age. The distribution of the respondents by gender showed that 51% of the respondents who completed the questionnaires were male, while female constituted 49%. This shows a balance in terms of gender involvement in the survey. Marital status of the respondents showed that 81% of the respondents were married, 8% single, 1% separated, 8% widow/er and 2% divorced. The big percentage of respondents who are married help bring out specific roles of household occupants. Education level demographics indicated that 7% of the respondents did not have formal education, 49% had up to primary school education, 31% had secondary school education and 3% had university degrees. The high percentage of respondents having up to primary school education may determine the level and nature of training that can have real impact on the farmers. A more practical training that is less theoretical may have impact on these farmers.

Household Members Involved in Food Crop Farming

The study sought to establish household members involved in food crop farming. The members engaged in farming contribute to labour needs, which may have a bearing on farm production. Table 2 shows the findings.

Table 2: Household Members Involved in Food Crop Farming

Members involved in farming			Male members		Female members			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1	3	2	0	2	1	0	1	1
2	25	20	1	36	31	1	46	39
3	17	14	2	35	30	2	29	25
4	27	22	3	26	22	3	25	21
5	18	15	4	11	9	4	10	8
6	16	13	5	2	2	5	3	3
7	7	6	6	2	2	6	2	2
8	5	4	7	1	1	8	1	1
9	3	2	8	1	1			
10	1	1	9	1	1			
14	1	1						

From table 2, 22% represent households with 4 members involved in food crop farming, 15% with 5 household members involved and 13% with 6 household members. The more members involved the likelihood of impacting farm produce where labour factor may influence output.

From the gender perspective, 31% represent households with only one male involved in food crop farming, while 39% represent household with one female member.30% were represent by 2 male household members participating in food crop farming, while 25% represented female household members. This implies that training of a single member of a household may be representative enough in the sub county.

Source of Farm Labour

The study probed source of farm labour by smallholder farmers. Figure 1 shows the findings.

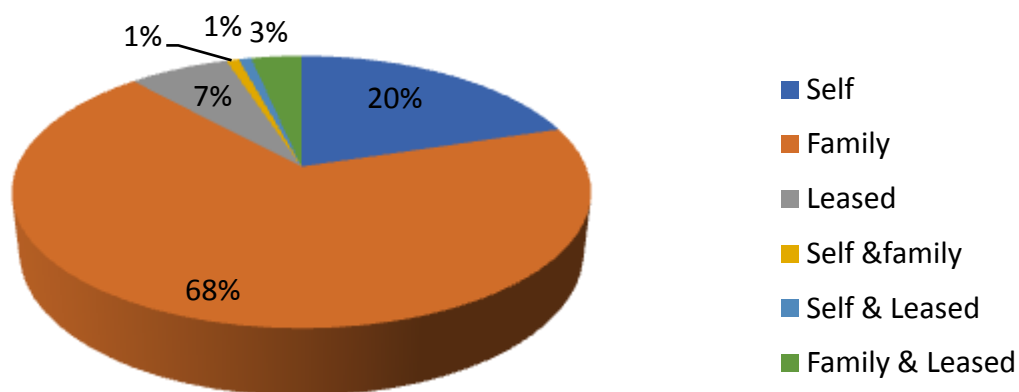


Figure 1: Source of Farm Labour

The results show that family provides 68% of farm labour, the smallholders’ farmers provide 20% of the farm labour, while only 7% is leased. Training of smallholders’ farmers should focus on families to have relatively impact the sub county.

Roles Household Occupants Undertake in Relation to FoodCrop Farming

The role household occupants undertake in relation to food crop farming was examined. Table 3 shows the output.

Table 3: Roles Household Occupants Undertake in Relation to Food Crop Farming

Roles	Male Frequencies	%	Female Frequencies	%	Children Frequencies	%
Land Preparation Clearing	87	20	35	10	21	8
Ploughing	81	19	40	11	25	10
planting	66	15	85	24	69	27
Plant management	57	13	44	12	14	5
Pesticide Control	62	14	41	11	17	6
Weeding	41	10	57	16	64	25
Post-Harvest Control	30	7	45	12	41	16
Others	9	2	13	4	7	3

Male household members undertake 20% of land clearing in food crop farming, while female household members undertake more (24%) of planting as well as children who are involved more (27%) in planting. Male assign 19% of their effort to ploughing as female assign 16% to weeding and children 25%. Male household members do less (7%) of post-harvest control, female less (10%) land preparation, while children less (5%) of plant management. Post-harvest control is done by both female (12%) and children (16%). This implies that trainings involving land preparations clearing and ploughing should focus more on male household occupants, while planting and weeding should focus on female household members.

Years Farmers have been Cultivating Food Crops

The study sought to understand the period smallholders farmers had been cultivating food crops. The experience these farmers have could enrich training when shared with colleagues. Figure 2 represents the findings.

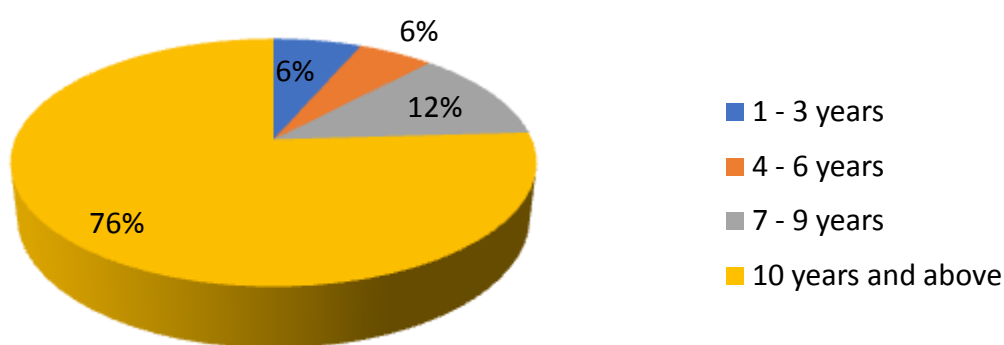


Figure 2: Years Farmers have been Cultivating Food Crops

The findings indicate that most (76%) smallholders' farmers have cultivated food crops for over 10 years and above. This implies they may have wealth of experience that need to be probed during training and best practices shared.

Number of Trainings Attended by Smallholders Farmers

The study investigated the number of trainings the smallholders farmers have participated in. Figure 3 shows the findings.

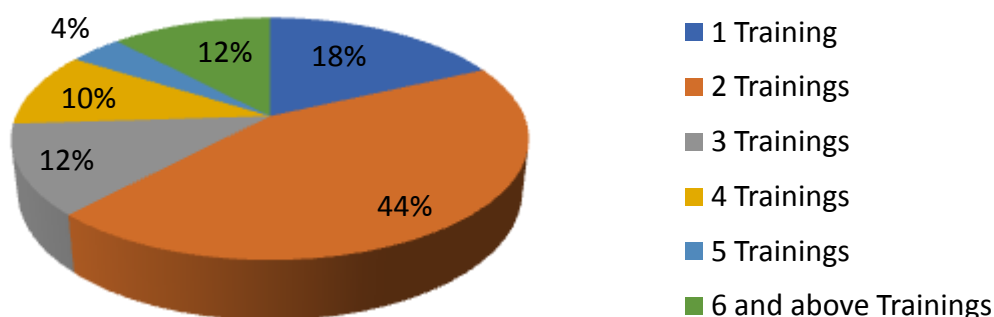


Figure 3: Number of Trainings Attended by Smallholders Farmers

The findings show that most farmers have received between 1 (18%) and 2 (44%) trainings. Some have received 3 (12%), 4(10%) and 5 (4%) trainings. Those who have received 6 and above trainings are 12%. This group can share knowledge when engaged as resource persons during farmers training.

Whether Farmers Need More Training and Adopt Any New Methods

Continuous training of smallerholders' farmers could guarantee absorption of new knowledge and technologies whenever they arose. The study investigated whether farmers needed more training as well as if they adopted any new methods of farming. Table 4 show the results.

Table 4: Whether Farmers Need More Training and Adopt Any New Methods of Farming

		Yes	No
1	Whether farmers need more training	97%	3%
2	Farmers adopted any new methods of farming	40%	60%

The findings show that 97% of farmers felt they needed more training. Only 40% of farmers adopted any new methods of farming and 60% did not. This means that overwhelming majority of farmers need more training, so opportunity for imparting new knowledge and techniques exist. Also, more effort needed to encourage farmers take up new farming methods.

The new farming methods farmers adopted include; mulching, crop rotation, intercropping, use of fertilizers, organic farming and drip irrigation.

Previous of food crop farming training Undergone.

The study investigated previous trainings, duration, the year of training, trainer, training effectiveness and farmers level of satisfaction. Table 5 shows the findings.

Table 5: Previous trainings undertaken

No	Area of training undergone	Duration of the training	Year	Institution which Imparted the training	Effectiveness of The training in Enhancing your competencies	Level of satisfaction*
1	Food security	3 days	2020	KESCAP	Very effective	A
2	Cassava planting	1 day	2014	FOE	Effective	B
3	Fertilizer use	2 hours	2021	One Acre Fund	Not Effective	C
4	Top Dressing	3 hours	2017	One Acre Fund	Effective	B
5	Crop management	1 day	2011	Agricultural officer	Fair/ Average	B
6	Weeding	1 day	2014	Agricultural officer	effective	A
7	Crop spacing	6 hours	2002	One Acre Fund	Not Effective	C
8	Crop farming	1 day	2015	One Acre Fund	Effective	B

* 'A' Highly satisfactory 'B'-Satisfactory 'C'-Unsatisfactory

The tables shows that smallholder farmers have undergone training in a range of food crop training areas like crop spacing, fertilizer use, crop management, and weeding. The training duration range from 2 hours to 1 day, and some training were done more than 10 years ago. One Acre Fund has conducted most of the trainings, and some have been deemed effective while other not effective. The level of satisfaction range from highly satisfied to unsatisfied.

The duration of training seems too short especially those that took 1 hour to 3 hours. The importance of re-trainings may help concretize some of the food crop farming concepts. Smallholders farmers seem to not be satisfied with training on fertizer use and crop spacing. This could affect farm output and therefore prudent that more training on these areas is done.

Valuable Resources to Incorporate in Farmers Training programmes

Effective training require employment of a range of resources. The study sought to establish which resources the smallholders' farmers thought were of value if incorporated in farmerstraing programmes. Table 6 shows their responses.

Table 6: Farmers TraingResouces

Resource	Least important	Less important	Somewhat important	More important	Most important
Group consultation with Agricultural/ Extension officers	3%	4%	2%	9%	82%
One-on-one consultation with farm specialist	11%	2%	5%	19%	63%
Guidebooks on specific agricultural topics/issues (i.e. rules and regulations; farm business planning)	22%	1%	5%	18%	54%
Videos - farmer interviews on production practices and techniques	19%	2%	9%	26%	44%
Round table meetings with fellow regionally-based farmers	4%	2%	6%	16%	72%
Communication skill	4%	0%	3%	15%	78%

From table 6, the most important resource to incorporate in farmers training is group consultation with agricultural/extension officers, which scored 82%, followed by communication skills that had 78%, round table meetings with fellow regionally-base farmers 72% and one-on-one consultation with farm specialist 63%. Guidebooks on specific agricultural topics/issues (i.e. rules and regulations; farm business planning) scored highest as least impotant at 22% followed by Videos - farmer interviews on production practices and techniques at 19%. This implies that group consultations is the most desired resource in farmers training. This is likely to give farmers opportunities to share experiences and farming best practices they know. Communication skills would be ideal for effective transfer of skills or knowledge during training sessions as well as to family members and farm workers.

Smallholder's Farmers Preferred Training Media

Different approaches to smallholders' farmers training may be employed. Training may be face to face or remotely conducted. This study investigated the preferred training media by across different gender of smallholders farmers. Table 7 shows the output.

Table 7: Smallholders' Farmers Preferred Training Media

Gender			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Radio	29	46.0	46.0	46.0
		Television	7	11.1	11.1	57.1
		Phone	19	30.2	30.2	87.3
		Online	2	3.2	3.2	90.5
		Newspaper	2	3.2	3.2	93.7
		Magazine	4	6.3	6.3	100.0
		Total	63	100.0	100.0	
Female	Valid	Radio	34	55.7	55.7	55.7
		Television	5	8.2	8.2	63.9
		Phone	14	23.0	23.0	86.9
		Online	2	3.3	3.3	90.2
		Newspaper	3	4.9	4.9	95.1
		Magazine	3	4.9	4.9	100.0
		Total	61	100.0	100.0	

The results revealed that both male and female farmers preferred radio at 46% and 55.7% respectively. This was followed by phone 30.2% for male and 23.0% for female. Television was the third preferred media with 11.1% for male and 8.2% for female. Online and newspaper media was the least preferred with 3.2% for male. The female registered 3.3% for online media while newspapers and magazines tied at 4.9%. This implies that radio media would reach most of male and female farmers if employed for training. The low percentage score for online media could be because some areas could be experiencing weak network providers signals or may not be covered at all. The cost of internet bundles could also be a limitation.

Answers to Research Questions

Research Q1 - What are the training needs of smallholders food crop farmers?

Smallholders Farmers Training Needs

The study examined the training needs of smallholders' farmers. They were asked to indicate their training needs in the context of food crop farming on a scale of 1-5 (1- least preferred, 5 - Most preferred). Table 8 shows the descriptives, indicating the means and standard deviations.

Table 8: Smallholders Farmers Training needs

Descriptive Statistics				
	N	Mean	Std. Deviation	Preferred Level
Seed selection/ Production	124	4.5887	0.91075	Most
Budgeting for farm activities & farm cost estimation	124	4.3145	1.19189	Very
Rainfall forecasting	124	4.2016	1.27502	Very
Farm Equipment Design, Operation and Maintenance	124	4.0968	1.30925	Very
Farm land preparation (ploughing/ tilling)	124	4.0887	1.30672	Very
Planting, transplanting, germination	124	4.1613	1.25838	Very
Crop management: Pest, diseases and weed control	124	4.5161	0.95835	Most
Crop harvesting	124	3.8548	1.41820	moderately
Post-harvest crop management	124	4.2581	1.20885	Very
Crop water requirements	124	4.2016	1.26863	Very
Rain water harvesting	124	4.1452	1.38924	Very
Basics farm irrigation	124	4.1129	1.41542	Very
Food crop farming resources management and use	124	4.3468	1.13370	Very
Funding of food crop farming	124	4.4032	1.03531	Very
Farm data collection, analysis and management	124	4.2742	1.17797	Very
Climate change and adaptation	124	4.2742	1.10681	Very
Disaster management: Floods and drought management	124	4.4919	1.03982	Most
Commercialization of food crop farms	124	4.3710	1.08551	Very
Diversification: medicinal plants, fiber crop, plants & fungi for food, market gardening	124	4.5000	0.97530	Most
Using new methods of farming on the farm	124	4.4516	1.06194	Most
ICT use on the farm: logistics needs assessments, yield monitoring and forecasting, credit scoring instrument	124	4.1774	1.40295	Very
Valid N (list wise)	124			

Table 8 shows the means and standard deviations of the training needs of smallholder farmers. The most preferred training included; Seed selection/ Production (mean =4.59, SD= 0.91), Crop management: Pest, diseases and weed control (mean = 4.52, SD = 0.96), Disaster management: Floods and drought management

(mean = 4.49, SD = 1.04), Diversification: medicinal plants, fiber crop, plants & fungi for food, market gardening (mean = 4.50, SD = 0.98) and Using new methods of farming on the farm (mean = 4.45, SD = 1.06). Crop harvesting was moderately preferred training (mean = 3.85, SD = 1.42). The results indicate that farmers having gone through some previous training, still their training needs reflected a range of activities along the food crop production channel.

Research Q 2 - What is the relationship between gender and previous training of smallholders' food crop farmers?

The study investigated relationship between gender and previous training of smallholders food crop farmers. It is common that women are not encouraged by their husband to attend trainings. This makes them contribute less especially if they have to supervise work on the farm. This study sought to investigate whether both male and female farmers had received any previous training. A Chi-square test for independence was conducted. A cross tabulation of gender and if smallholders farmers had trained before was conducted. Table 9 shows the findings.

Table 9: Cross Tabulation of Gender and Whether Farmer were Trained Before

			Trained Before		Total
			Yes	No	
Gender	Male	Count	30	33	63
		% within Gender	46.9%	53.1%	100.0%
		% within Trained Before	43.5%	61.8%	51.6%
Female	Female	Count	39	22	61
		% within Gender	65.0%	35.0%	100.0%
		% within Trained Before	56.5%	38.2%	48.4%
Total	Total	Count	69	55	124
		% within Gender	55.6%	44.4%	100.0%
		% within Trained Before	100.0%	100.0%	100.0%

Table 9 show that 46.9% of male farmers had received training, while 53.1% had not received trained. For female farmers, 65.0% had received training, 35.0% had not received training. A total of 55.6% of the farmers had received training, while 44.4% had not received training. This implies that more male farmers (53.1%) have not received training compared to only 35.0% of female farmers. Most female farmers (65.0%) have received training compared to 46.9% of male farmers. Chi-Square test results are shown on table 10.

Table 10: Chi-Square Test

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.122 ^a	1	.042	.048	.032
Continuity Correction ^b	3.420	1	.064		
Likelihood Ratio	4.150	1	.042		
Fisher's Exact Test					
Linear-by-Linear Association	4.089	1	.043		
N of Valid Cases	124				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 26.61.
 b. Computed only for a 2x2 table

The results in table 9 show that the assumptions of Chi-Square Test were not violated as all expected cell sizes are greater than 5 (greater than 26.61 - shown in the footnote). Table 11 shows the symmetric measures.

Table 11: Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.182	.042
	Cramer's V	.182	.042
N of Valid Cases		124	

A Chi-square test for independence (with Yates Continuity Correction) indicated no significant association between gender and previous training status of the smallholders farmers, $\chi^2(1, n = 124) = 3.42, p = .064, \phi = -.18$. The p value of .064 is greater than alpha value of .05. This means that the proportion of male farmers who have been trained is not significantly different from the proportion of female farmers. Therefore, there appears to be no association between farmers' previous training status and gender.

Research Q3 - Is there a relationship between gender and training needs of smallholders' food crop farmers?

The study sought to establish the relationship between gender and training needs of smallholders' food crop farmers. Spearman's Rank Order Correlation (rho) was conducted. Table 12 shows the correlation results.

Table 12: Spearman's Rank Order Correlation

			Gender	Farmers Total Training Needs
Spearman's rho	Gender	Correlation Coefficient	1.000	-.117
		Sig. (2-tailed)	.	.202
		N	123	121
	Farmers Total Training Needs	Correlation Coefficient	-.117	1.000
		Sig. (2-tailed)	.202	.
		N	121	122

The relationship between gender and farmers total training needs was investigated using Spearman's Rank Order Correlation (rho). Preliminary analyses were performed to ensure assumptions were not violated. There was a weak, negative correlation between the two variables, $r = -.12$, $n = 121$, $p < .202$, with gender association with farmers total training needs being low. Therefore, the relationship between gender and training needs of smallholders' food crop farmers is weak; hence there may be no need to design unique training for different gender.

The coefficient of determination indicates that gender helps to explain only 1.44% of variance in the training needs. This shows gender should not be used as a basis for determining farmers training needs. The training needs for both gender are relatively the same.

III. Summary of the Findings

In this study 51% of the respondents were male, while 49% were female. Findings also revealed that 31% represented households with only one male involved in food crop farming, while 39% represent household with one female member. This implies that training of a single member of a household may be representative enough in the sub county. The results also showed that the family provides 68% of farm labour, the smallholders' farmers provide 20% of the farm labour, while only 7% is leased, implying that training of smallholders' farmers should focus on families to have relative impact on the sub county. It was revealed that male household members undertake 20% to land clearing in food crop farming, while female household members undertake more (24%) of planting as well as children who are involved more (27%) in planting. Male household members do less (7%) of post-harvest control, female less (10%) land preparation, while children less (5%) of plant management. This implies that trainings involving land preparations clearing and ploughing should focus more on male household occupants, while planting and weeding should focus on female household members. The findings indicate that most (76%) smallholders' farmers have cultivated food crops for over 10 years and above hence availability of wealth of experience that need to be tracked during training and best practices shared.

The findings show that most farmers have received between 1 (18%) and 2 (44%) trainings. Some have received 3 (12%), 4(10%) and 5 (4%) trainings. Those who have received 6 and above trainings are 12% a group that can share knowledge when engaged as resource persons during farmers training. The trainings lasted between one hour and 3 days and most of the trainings were done by One Acre Fund. Some trainings took place more than 10 years ago and there were mixed levels of satisfaction with some farmers feeling the trainings were effectively done and were satisfied, while other were dissatisfied. There is an indication that more male farmers (53.1%) have not received training compared to only 35.0% of female farmers. Most female farmers (65.0%) have received training compared to 46.9% of male farmers. Also, 97% of farmers felt they needed more training, only 40% of farmers adopted any new methods of farming and 60% did not. This means that overwhelming majority of farmers need more training, so opportunity for imparting new knowledge and techniques exist. Also, more effort needed to encourage farmers take up new farming methods.

The valuable resources farmers preferred to be incorporated in their training are; group consultation with agricultural/extension officers, which scored 82%, followed by communication skills that had 78%, round table meetings with fellow regionally-base farmers 72% and one-on-one consultation with farm specialist 63%. Guidebooks on specific agricultural topics/issues (i.e. rules and regulations; farm business planning) scored highest as least important at 22% followed by Videos - farmer interviews on production practices and techniques at 19%. This implies that group consultations is the most desired resource in farmers training. This is likely to give farmers opportunities to share experiences and farming best practices they know. Communication skills

would be ideal for effective transfer of skills or knowledge during training sessions as well as to family members and farm workers.

The results for preferred training media revealed that both male and female farmers preferred radio at 46% and 55.7% respectively, followed by phone 30.2% for male and 23.0% for female, and television was the third preferred media with 11.1% for male and 8.2% for female. Online and newspaper media was the least preferred with 3.2% for male. The female registered 3.3% for online media while newspapers and magazines tied at 4.9%. This implies that radio media would reach most of male and female farmers if employed for training. The low percentage score for online media could be because some areas could be experiencing weak network providers signals or may not be covered at all. The cost of internet bundles could also be a limitation.

The smallholders' farmers training needs were established from their preferred training areas they selected. The most preferred training included; Seed selection/ Production (mean =4.59, SD= 0.91), Crop management: Pest, diseases and weed control (mean = 4.52, SD = 0.96), Disaster management: Floods and drought management (mean = 4.49, SD = 1.04), Diversification: medicinal plants, fiber crop, plants & fungi for food, market gardening (mean = 4.50, SD = 0.98) and Using new methods of farming on the farm (mean = 4.45, SD = 1.06). Crop harvesting was moderately preferred training (mean = 3.85, SD = 1.42). The results indicate that farmers having gone through some previous training, still their training needs reflected quite a range of activities along the food crop production channel.

A Chi-square test for independence (with Yates Continuity Correction) indicated no significant association between gender and previous training status of the smallholders farmers, $\chi^2 (1, n = 124) = 3.42, p = .064, \phi = -.18$. The p value of .064 is greater than alpha value of .05. This means that the proportion of male farmers who have been trained is not significantly different from the proportion of female farmers. Therefore, there appears to be no association between farmers' previous training status and gender.

The relationship between gender and farmers total training needs was investigated using Spearman's Rank Order Correlation (rho). There was a weak, negative correlation between the two variables, $r = -.12, n = 121, p < .202$, with gender association with farmers total training needs being low. Therefore, the relationship between gender and training needs of smallholders' food crop farmers is weak; hence there may be no need to design unique training for different gender. The coefficient of determination indicates that gender helps to explain only 1.44% of variance in the training needs. This shows gender should not be used as a basis for determining farmers training needs. The training needs for both gender are relatively the same.

IV. Conclusion

There is an indication that more male farmers have not received training compared to their female counterparts. Male household members undertake more of land clearing roles in food crop farming, while female household members undertake more of planting and weeding. Male household members do less of post-harvest control, female less land preparation, while children less of plant management. Group consultations is the most desired resource to be incorporated in farmers training. This is likely to give farmers opportunities to share experiences and farming best practices they know. Communication skills would be ideal for effective transfer of skills or knowledge during training sessions as well as to family members and farm workers. The most preferred training media for training was radio by both male and female farmers, followed by phone, and television was the third preferred media. Online and newspaper media was the least preferred by both male and female. This implies that radio media would reach most of male and female farmers if employed for training. The low percentage score for online media could be because some areas could be experiencing weak network providers signals or may not be covered at all. The cost of internet bundles could also be a limitation.

The established farmers training needs included training in; seed selection/ Production, Crop management, Disaster management, Crop Diversification, and Using new methods of farming on the farm. A Chi-square test for independence (with Yates Continuity Correction) indicated no significant association between gender and previous training status of the smallholders farmers, $\chi^2 (1, n = 124) = 3.42, p = .064, \phi = -.18$. Also, the relationship between gender and farmers total training needs was investigated using Spearman's Rank Order Correlation (rho) which revealed a weak, negative correlation between the two variables, $r = -.12, n = 121, p < .202$, with gender association with farmers total training needs being low. The coefficient of determination indicated that gender helps to explain only 1.44% of variance in the training needs. It was concluded that gender should not be used as a basis for determining farmers training needs. The training needs for both gender are relatively the same.

V. Recommendation

Male farmers need to be encouraged to participate in farm food crop production trainings. The study revealed that they had not participated in previous trainings compared to their female counterparts.

Group consultations should be incorporated in farmers training. This presents opportunities for sharing experiences and farming best practices among participants.

The ideal media for training smallholders' farmer is radio and phone. Online media should be avoided as it received lower percentage in terms of its preference.

Gender should never be used to design training programmes since the training needs of both male and female farmers are relatively the same. The influence of gender on training needs was negligible.

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